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FILE

ENVIRONMENTAL CONSULTING & MANAGEMENT
ROUX ASSOCIATES INC



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WEST DEPTFORD, NEW JERSEY 08066
856 423-8800 FAX 856 423-3220



June 21, 2005

Victoria E. Ioff
Remedial Project Manager
United States Environmental Protection Agency
Region III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

Re: NGK Site Work Plan

Dear Victoria:

On behalf of NGK Metals, Inc., Roux Associates, Inc. is pleased to submit copies of the document entitled, "Work Plan for Assessing Groundwater Conditions in the Vicinity of the NGK Metals Site, Reading, Pennsylvania". The document incorporates the changes agreed upon in our last meeting.

As the next step, after you and you colleagues have reviewed the plan, I suggest that we meet at you office to discuss the schedule and other details as may be appropriate.

I look forward to moving ahead on the project, and appreciate your help, as always.

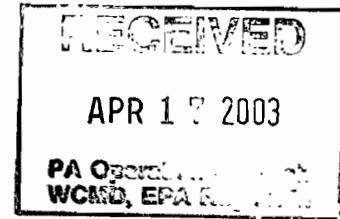
Sincerely,

A handwritten signature in black ink, appearing to read "M. A. Hewitt".

Marilyn A. Hewitt, P.G.
Principal Geologist

cc: Lynne Woodside
NGK Metals Corporation
917 US Highway 11 South
Sweetwater, TN 37874





ENGINEERING DESIGN REPORT

Final (100 Percent Complete) Design

RCRA Corrective Measures Implementation

East Red Mud Area & West Red Mud Area Closures

NGK Metals Corporation Facility

Muhlenberg Township, Berks County, Pennsylvania

Prepared for:
NGK Metals Corporation
P.O. Box 13367
Reading, Pennsylvania 19605

Prepared by:
Earth Tech, Inc.
1000 Stonewood Drive
Suite 300
Wexford, Pennsylvania 15090

June 2002
Revised September 2002
Revised April 2003

1.0 INTRODUCTION

This Final (100% percent complete) Engineering Design Report ("Design Report") has been prepared by Earth Tech, Inc., on behalf of NGK Metals Corporation (NGK), for both the East Red Mud Area (ERMA) and West Red Mud Area (WRMA) Closures at the NGK facility ("Facility") located in Muhlenberg Township, Berks County, Pennsylvania. This Report has been prepared based on the requirements set forth in the Corrective Measures Study and the RCRA 3008(h) Administrative Order (AO) number RCRA-3-067CA, issued by the US Environmental Protection Agency (EPA), dated June 30, 1994.

NGK is currently implementing the construction of various environmental facilities as part of the RCRA Corrective Measures Implementation Project at the Facility. In accordance with Paragraph F2 (Interim Measures – Draft IM Workplan) of the Final Order and Joint Stipulation dated June 30, 1994, between NGK and EPA, NGK has delineated and proposes to complete specific corrective measures within the ERMA.

The purpose of the corrective action is to remediate the former ERMA and the WRMA. The red mud shall be removed from the WRMA and placed within the ERMA. A cap shall be placed on the ERMA to inhibit the infiltration of precipitation into the red mud. The corrective action plan also includes the procedures to manage stormwater runoff and runoff associated with the closed ERMA. The facility background, summary of previous site investigations/meetings and Design Report objectives are described in this section.

1.1 FACILITY BACKGROUND

The Facility is situated on an approximate 65-acre parcel of land located about four (4) miles north of downtown Reading, Pennsylvania. The Facility is bound on the north by Tuckerton Road, on the east by Conrail railroad tracks, on the south by Water Street, and on the west by commercial and residential buildings. The specific location of the NGK Facility is shown on Figure 1-1, Site Location Map.

Industrial activities occurred at this location prior to November 1935 while the Facility was owned and operated by the Pennsylvania Malleable Iron Company. In November 1935, Beryllium Corporation purchased the Facility. In March of the following year, through its subsidiary, the Beryllium Corporation of Pennsylvania, manufacturing operations began at the Facility. In October 1968, the Beryllium Corporation merged with the Kawecki Chemical Corporation to form Kawecki Berylco Industries, Inc. (KBI). In May of 1978, KBI became a wholly owned subsidiary of Cabot Corporation (Cabot). In October 1982, KBI was merged into Cabot Corporation. On September 30, 1986, Cabot sold the assets of the Reading beryllium alloy plant to NGK Metals Corporation (NGK), a wholly owned subsidiary of NGK Insulators Ltd. Operations at the NGK Facility were discontinued in March of 2000.

Since the mid-1930s this site was used to manufacture beryllium-containing products. Wastes resulting from the extraction, manufacture, and processing of beryllium related products were managed on-site from the mid-1930s until the early to mid-1960s. Wastes disposed at the facility include ore and gangue, the residual solid waste from the extraction of beryllium from beryl ore. "Red mud" is the term used to describe the beryllium-containing, iron-rich ore and gauge material. The term red mud is derived from the characteristically bright red color that is a result of the high iron content. Physically, the red mud consists of slightly clayey, silty sand to sandy silt material.

Also retained at the Facility were waste sludges resulting from the use of lime to treat and neutralize wastewaters resulting from the manufacturing operations. Beryllium and chromium in these on-site solid

waste management units were in excess of the acceptable EPA risk based concentrations. Constituents of primary concern that have been detected in groundwater in concentrations above National Primary Drinking Water Standards include metals (beryllium, chromium, cadmium), fluorides, and organic solvents (1,1-dichloroethylene and trichloroethylene).

To date, approximately 8.5 acres of red mud have been capped at the Facility as shown on Earth Tech Drawing CL-02. The underground collection and conveyance piping for the groundwater recovery and treatment system has been installed, as has the treatment system. The groundwater treatment system began operation in June of 2002.

1.2 SUMMARY OF PREVIOUS SITE INVESTIGATIONS/MEETINGS

An investigation of the ERMA was initiated at NGK's request in April 1997 by Earth Tech (formerly Rust Environment & Infrastructure). The report, entitled NGK METALS CORPORATION, RCRA CORRECTIVE MEASURES IMPLEMENTATION, EAST RED MUD AREA-SOIL BORING INVESTIGATION, September 1998, presents the results of the investigation. Forty-six (46) Geoprobe® soil borings were drilled and four (4) hand-dug test pits were excavated and examined by Earth Tech geologists to delineate the extent of Red Mud present in the ERMA. The investigation was conducted in two (2) phases. Phase I consisted of on-property activities. At the conclusion of Phase I it was apparent that Red Mud extended to the eastern property line in the central portion of the ERMA. Phase II consisted of off-property activities and began after receiving authorization for access to the adjacent property from the Pennsylvania Department of Transportation ([PENNDOT] property owner at that time) and from the Reading and Northern Railroad ([RAILROAD] tenant at that time). Permission from PENNDOT was secured on August 11, 1997 by a letter of Concurrence with reference to a 1991 Right of Access Agreement. A RAILROAD inspector's schedule was established on October 14, 1997. The off-property soil boring program began on October 27, 1997. Subsequent to the field activities for this investigation, the adjacent PENNDOT property was sold to the RAILROAD.

On August 12, 1999, a project meeting was held at the Facility with representatives from NGK, Earth Tech, PENNDOT, RAILROAD, PADEP and the U.S. Army Corp of Engineers ([USACE] on behalf of the EPA). The purpose of the meeting was to discuss the findings of the investigation and potential remedial options. The general conclusion of the meeting was that excavation of the delineated Red Mud from the off-property area and subsequent incorporation below the on-property ERMA RCRA cap was an acceptable remedial technique. However, the issues of confirmatory sampling and analysis (of the underlying soil in the off-property red mud excavation) as well as liability protection were raised during the meeting. Pennsylvania's Land Recycling and Environmental Remediation Standards Act (Act 2) was discussed as the most logical platform to address both issues.

In addition to the ERMA discussed in this report, an additional deposit of Red Mud was discovered in the northwestern quadrant of the facility in August 2001, during construction activities associated with the groundwater treatment system. This deposit has been designated the WRMA in this report. Earth Tech delineated approximately 2.5 acres of Red Mud during a soil boring investigation conducted in August through December 2001. The findings of the investigation are presented in a report entitled RCRA Corrective Measures Implementation, Western Red Mud Area, Soil Boring Investigation, dated March 2002.

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1.3 DESIGN REPORT OBJECTIVES

The objective of this Design Report is to present the information required as part of the AO. The AO includes a requirement that the 100 Percent Design Report shall contain the following:

- Design Criteria; and,
- Detailed plans, drawings and sketches.

This Report has been prepared in accordance with EPA's Record of Decision (ROD) and AO. The design includes the detailed information required for the closure of both the ERMA and WRMA.

2.0 FINAL REMEDIAL DESIGN CRITERIA

This section includes a description of the remedial design criteria including design issues and considerations for closure of the ERMA and WRMA. The major design components include:

- Existing red mud material within the ERMA;
- Red mud excavation (from off site and the WRMA) and placement within the ERMA;
- Management of miscellaneous features;
- Grading Plans;
- Cap designs for the ERMA; and,
- Stormwater management/erosion and sediment control.

The design criteria relative to each of these design components is provided in the following sections.

2.1 EXISTING RED MUD MATERIAL

Several existing stockpiles of red mud material are present within the ERMA. The locations of the red mud stockpiles are shown on Earth Tech Drawing Number CL-02. The first stockpile includes red mud that was removed during the excavation for the installation of the 24-inch diameter sewer pipe through the ERMA, during the 1996 Pond 1-cap construction activities. The red mud stockpiles are covered with Griffolyn TX, a low permeability geotextile type material. Also, several miscellaneous non-hazardous debris stockpiles are present within the ERMA. The miscellaneous debris stockpiles shall also be managed along with the red mud.

2.2 RED MUD EXCAVATION AND PLACEMENT

In order to complete the closure of the ERMA, in-situ red mud (both on-site and off-site) shall be excavated and consolidated within the limits of the proposed ERMA cap. Information pertaining to the red mud excavation and placement is provided below.

2.2.1 Red Mud Excavation

As part of the corrective action, the below grade red mud that has been identified shall be excavated, hauled and placed/compacted within the ERMA prior to capping. The estimated lateral and vertical extent of red mud excavation is shown on Earth Tech Drawing Number CL-03. The resulting excavations shall be restored by backfilling with clean, compacted general earthfill and six inches of topsoil to the previously existing grades. The final grades shall be seeded. The proposed red mud excavation areas are described below.

2.2.1.1 Off-Site Railroad Property

Coordination shall be required with the Reading and Northern Railroad prior to excavating the red mud within the property. A railroad safety inspector is required to be present during excavation activities and a permit for such intrusive activities may also be required. Railroad representative shall be contacted in advance of construction activities to fully assess all requirements. Also, a section of the perimeter fence shall be removed during the off-site excavation activities and replaced following the excavation work as described in the Technical Specifications.

Based on the discussion during the August 12, 1999 project meeting, the preferred remedial measure for the impacted Railroad property shall include the excavation of in-situ red mud and any impacted material that exceeds the Pennsylvania Act 2 Residential and Non-Residential Statewide Health Standard (SHS) Medium Specific Concentrations (MSCs) values for beryllium. The lowest value under the MSCs is 320 mg/kg, which shall be utilized as the clean-up criteria. Confirmatory soil sampling and analyses for beryllium shall be performed following the off-site excavation activities and prior to backfilling in this area.

Excavation shall be required along approximately 850 feet of the adjacent eastern boundary/property line in the upper soil zone to an average depth of about two to three feet (refer to site investigation described in Section 1.2) as shown on Earth Tech Drawing Number CL-03. The lateral extent of the excavation beyond the property line shall average approximately five to 15 feet to the east. The depth and lateral extent shall vary based on the actual extent of the red mud encountered during remedial construction. Although the estimated extent of the red mud has been delineated, visual observations in conjunction with the analytical results during the excavation process shall be required for over excavation of the red mud material. Approximately 800 cubic yards of red mud is anticipated within the Railroad property based on the results of the field investigation. The excavated material shall be consolidated below the proposed ERMA cap.

2.2.1.2 West Red Mud Area

The limits of the WRMA were identified as part of the site investigation described in Section 1.2. The proposed remedial action in the WRMA consists of excavating the red mud layers greater than one (1) foot in thickness for subsequent consolidation within the ERMA.

Based on the results of the field investigation, the red mud layer greater than one foot thick shall be excavated within an approximate 280 feet by 120 feet area. The anticipated depth of excavation shall range from one to nine feet below the existing grade. The estimated excavation limits are shown on Earth Tech Drawing Number CL-03. Although the estimated extent of the red mud has been delineated, visual observation during the excavation process shall be required for over excavation of the red mud material. Approximately 4,100 cubic yards of red mud are anticipated within the WRMA based on the results of the field investigation.

2.2.1.3 East Red Mud Area

Excavation of red mud shall also be necessary within the ERMA during remedial construction. The ERMA excavations include the proposed channel construction and cap system key trench. The excavated red mud shall be placed/compacted below the ERMA cap.

2.2.2 ERMA Construction Staging Plan

The general construction sequence is described below.

1. The miscellaneous ERMA features shall be managed (refer to Section 2.3).
2. Prior to earth moving activities, the silt fence shall be installed. Additionally, the sediment trap/drop inlet number 3 shall be installed. The eastern perimeter channel subgrade shall be excavated concurrently with the off site red mud removal. Hay bales shall be temporarily placed in the channel until the final lining of the channel is initiated.

3. The off-site red mud shall be excavated first.
4. The Griffolyn TX geotextile shall be removed from the stockpiles in a sequential manner. The geotextile removal shall be staged such that the active work areas are exposed while retaining the geotextile in other areas until grading proceeds in those areas. The exposed stockpiles shall be rough graded and proof rolled. The excavated red mud shall be sufficiently compacted against the stockpiles as needed.
5. The second area to be excavated shall be the WRMA.
6. The placement of the excavated red mud shall generally proceed in a south to north direction. The red mud material shall be placed in uniform eight-inch ("loose") lifts and compacted. The grading scenario is described in Section 2.4 of this report.
7. As the placement of the red mud progresses towards the northern portion of the ERMA, the red mud in the vicinity of drop inlet numbers 2 and 4 shall be graded to drain toward the drop inlets prior to installation.
8. The final red mud surface shall be fine graded and the cap system shall be installed. Also, the final lining system for the eastern perimeter channel shall be installed.

The construction sequence described above is presented for general planning purposes. The Remedial Construction Contractor shall select an alternate construction sequence if approved by NGK and the Construction Quality Assurance Officer.

2.3 MANAGEMENT OF MISCELLANEOUS ERMA FEATURES

Several existing features are located within the proposed limit of the ERMA cap. The locations of the major miscellaneous ERMA features are presented on the Earth Tech Drawings, provided as Appendix C. These features shall be managed by various means as described below.

1. Thirteen manholes: Riser sections shall be added as needed to extend four manholes, with new manhole covers to match the final top of cap grades. The cap system shall be keyed into the manholes as shown on Earth Tech Drawing Number CL-07. Manholes 4 and 5 shall be abandoned, by removing riser sections and the lids. It is desired to maintain the piping in the manholes if at all possible. The remaining manholes shall be left in place and the cap placed around these manholes as shown on Earth Tech Drawing Number CL-07. Manhole locations and elevations are shown on Earth Tech Drawing Number CL-05.
2. Five Telephone Poles and Four Associated Guy Wire Supports: The cap system shall be keyed into the telephone poles and guy wires at the approximate elevations and/or locations shown on Earth Tech Drawing Number CL-05. The cap system shall be keyed into the power poles and associated guy wires as shown on Earth Tech Drawing Number CL-07. Prior to initiating construction, the potential logistics shall be evaluated and utility company notifications shall be performed. Mandatory clearances from overhead lines shall be maintained as required by applicable State and Federal regulations.

3. Two Electrical Conduit Pull Boxes: These flush mounted pull boxes/electric manholes as shown on the Earth Tech Drawings shall be abandoned by removal or shall be left in place and covered over. Conduit is in place, however, no wiring exists within the conduit.
4. Two Groundwater Monitoring Wells: Monitoring wells SW-5 and DW-5 as shown on Earth Tech Drawing Number CL-02 shall be extended. The existing concrete collars shall be removed, along with the steel guard pipes. The PVC riser piping shall be extended as needed to be no more than 3 inches below the top of the cap and flush-mount well covers installed to match the final top of cap grades. Flush-mount well covers shall be installed to complete the wells.
5. Six Miscellaneous Concrete Structures:
 - Settling Tank 101 - The above grade concrete walls shall be demolished and placed flush with the existing ground surface. The settling tank shall be backfilled with alternating lifts of crushed concrete followed by compacted red mud. The concrete shall be crushed into fragments ranging from 0.5' to 1.0' diameter and placed in 1.0' lifts. Eight-inch thick loose lifts of red mud shall be placed sequentially above each lift of crushed concrete.
 - Concrete Box (3 feet high x 7 feet square) – This storm sewer access way as shown on Earth Tech Drawing Number CL-02 shall remain in place and does not require extension. An electrical box is also located on a post attached to this access way. The electrical box shall be removed as well as the buried conduit. NGK Metals shall deactivate the power source prior to initiation of construction.
 - Former Drum Storage Pad Area – The concrete pad shall remain in place or be demolished and placed under the area to be capped.
 - Concrete Box (2 feet high x 5 feet wide x 6 feet long) - This storm sewer access way as shown on the Earth Tech Drawings shall remain in place and requires extension to be a minimum of 6 inches above the final grade of the cap. An electrical box is also located on a post attached to this access way. The electrical box can be removed as well as the buried conduit. NGK Metals shall deactivate the power source prior to initiation of construction.
 - Former Aboveground Storage Tank (AST) Concrete Pad Area – The concrete pad, shown on Earth Tech Drawing Number CL-02, near drop inlet number 4 shall remain in place or be demolished and placed under the area to be capped.
 - Small Concrete Block Building and Associated Overhead Pipe Rack Area – The concrete block building shown on the Earth Tech Drawings, near drop inlet number 4, and associated pipe rack shall be demolished and placed under the area to be capped.
6. Miscellaneous Metal Parts/Scrap/Machinery – These items shall be removed from within the area to be capped and placed in the residual waste landfill on site and/or disposed off site at a permitted facility.

7. Trash Compactor – The trash compactor located outside the dross building northwest of drop inlet number 2 shall be relocated from the area to be capped and placed at an alternative location to be selected by NGK Metals.
8. High Voltage Area – No construction shall be performed within the high voltage area fence line. A minimum offset of five feet (outside the fence line) shall be observed for all construction activities. Also, all buried conduits shall be identified as part of the utility clearance activities (refer to Health and Safety Plan).
9. Railroad Spur – The railroad spur shall be dismantled, relocated and placed below the cap.

2.4 ERMA GRADING PLAN

A volume estimate of red mud that shall be excavated and consolidated below the proposed ERMA cap has been provided in Appendix A based on the excavation scenario shown on Earth Tech Drawing Number CL-03. Earth Tech performed an iterative computer evaluation (i.e., cut/fill evaluation) in order to prepare a final grading plan that shall contain the estimated volume of material to be capped. The cut/fill evaluation results are also provided in Appendix A.

The ERMA grading plans for the red mud material and asphalt cap are provided on Earth Tech Drawing Numbers CL-04 and CL-05, respectively. The actual red mud material managed during construction may vary from the estimated volumes provided in Appendix A. Therefore, the Remedial Construction Contractor may alter the final elevations slightly in order to accommodate the actual volume encountered during construction. However, the final contours shall be graded to a minimum three percent slope and the grades shall not exceed a 20 percent slope.

2.5 ERMA Asphalt Cap System Design

The EPA-approved cap design included as part of the document titled “Corrective Measures Implementation, Capping System and Retention Basin Final (100% Percent) Design Report, prepared by Rust Environment and Infrastructure, dated April 1996” shall be utilized for this design submittal.

The cap consists of the following components (in ascending order):

- 16-ounce/square yard non-woven geotextile;
- 60 mil HDPE geomembrane;
- A geocomposite drainage net;
- 12-inch layer of gravel;
- 4.5-inch layer of bituminous concrete base course; and,
- 1.5-inch layer of asphalt wearing course.

The cap system described above was previously installed in conjunction with the closure of the Red Mud Disposal Area and Pond 1, and the existing cap has been performing effectively.

2.6 STORMWATER MANAGEMENT/EROSION AND SEDIMENT CONTROL

As previously stated, one of the objectives of the corrective action is to implement runon and runoff control measures in the ERMA. Earth Tech has prepared a stormwater management/erosion and sediment (E&S) control plan to address runon and runoff as described herein. The E&S plan includes both

temporary and permanent procedures for managing stormwater and minimizing sediment transport. The stormwater management/E&S control features are shown on the Drawings. The permanent stormwater management/E&S control design calculations are provided in Appendix B. A description of the temporary and permanent stormwater management/E&S Plan is provided below.

2.6.1 Temporary Stormwater Management/E&S Controls

The purpose of the temporary E&S controls is to manage stormwater and minimize sediment transport during earthwork activities. Prior to initiating construction, silt fence shall be placed around the perimeter of the work area. A detail of the silt fence is shown on Earth Tech Drawing Number CL-08. Silt fence shall also be placed on an as-needed basis in discrete locations around stockpile areas. The "working face" during red mud grading shall be contoured during construction to facilitate stormwater management and minimize sediment transport. The silt fence shall be removed following construction. Hay bales shall also be temporarily placed in the eastern perimeter channel prior to the placement of the final lining system.

A temporary synthetic cover (i.e., "rain tarp") shall be placed above the exposed red mud in the ERMA when precipitation occurs. Also, the temporary cover shall be placed above the red mud at the end of each workday as needed based on the weather forecast.

The Contractor shall take all precautions and measures that are necessary to ensure that no red mud material migrates off-site. In the event that impacted soil migrates beyond the Facility, the Contractor shall be solely responsible for addressing the situation.

2.6.2 Permanent Stormwater Management/E&S Controls

The existing stormwater management/E&S control system (i.e., channels, 24-inch diameter pipe, 15-inch diameter pipe and retention basin) will be utilized to the extent possible for the ERMA capping system. The existing channel shall convey a portion of the runoff from the western portion of the ERMA cap. Stormwater runoff from the cap shall be directed to the existing 24-inch and 15-inch diameter pipes via proposed drop inlets. The existing retention basin was redesigned to accommodate the additional flow from the ERMA cap. The proposed upgrade to the retention basin includes raising the berm height to increase the capacity. The associated appurtenances for the retention basin have also been modified as shown on the Drawings.

The proposed permanent stormwater management/E&S control features include:

1. An eastern perimeter channel to collect and convey stormwater runoff from the eastern portion of the ERMA cap.
2. The eastern perimeter channel shall discharge the stormwater to a sediment trap/drop inlet number 3. The sediment trap has also been designed to collect potential sheet flow from the ERMA. An "overflow spillway" has been integrated to the sediment trap to discharge potential overflow stormwater directly into the existing channel.
3. Drop inlet number 2 was designed to handle the stormwater along the northern perimeter of the cap system. The surrounding topography for drop inlet number 2 has been designed such that potential stormwater overflow would also be directed into the existing channel.
4. Drop inlet number 4 was designed to handle the stormwater from the northeastern portion of the cap system. The surrounding topography for drop inlet number 4 has been designed such

that potential stormwater overflow would also be directed into drop inlet number 2 and/or the existing channel.

Potential stormwater runoff from the northern reaches of the Facility is controlled via the existing asphalt diversion berm. Any stormwater that should breach the asphalt diversion berm would flow into drop inlet number 2 and/or drop inlet number 4.

More detailed information pertaining to the stormwater management/E&S design elements is provided below.

2.6.2.1 Existing Retention Basin

Earth Tech used TR-55 software to route the 2-year, 10-year, and 100-year, 24-hour storm events through the existing channel and retention basin to determine if the existing system could handle the additional stormwater flow expected from the proposed ERMA closure. The result of the stormwater analysis of the existing retention basin based on the additional drainage flow from the ERMA area along with the retention basin area, indicate that the current basin design would not meet the stormwater management regulations of Muhlenberg Township. Muhlenberg Township requires the top of berm to be a minimum of six inches above the 100-year, 24-hour rainfall flow through the emergency spillway with the principal outlet structure blocked. The Township also requires the emergency spillway crest to be a minimum of six inches above the 100-year storm event peak elevation. To comply with Muhlenberg Township's stormwater management requirements, the following modifications have been incorporated into the existing retention basin design:

- Raise the top of berm elevation of the retention basin by 2.5 feet from elevation 318.5 to elevation 321.
- Raise the emergency spillway crest elevation by 1.75 feet from elevation 317.5 to elevation 319.25 feet.

Stormwater analysis also shows that no modification is required to the principal outlet structure; the 18-inch diameter perforated riser pipe. However, a 10-foot extension to the discharge pipe of the riser pipe is required to accommodate for increasing the height of the berm/addition of fill material above the berm sideslope. The proposed modifications to the existing stormwater basin are shown on Earth Tech Drawing CL-06.

2.6.2.2 Existing and Proposed Channels

As previously mentioned, the existing channel shall convey the runoff from the western portion of the ERMA cap to the existing retention basin. An evaluation of the existing channel was performed to determine if the channel could accommodate the additional stormwater flow from the ERMA cap. The result of the evaluation indicates that the existing channel is adequately sized to properly convey the additional stormwater flow from the ERMA area. The existing channel/cap interconnection detail is shown on Earth Tech Drawing CL-07.

The proposed eastern perimeter channel shall collect runoff from the eastern portion of the ERMA cap. This channel is designed to convey stormwater to the proposed sediment trap to be constructed northeast of the existing retention basin. From the sediment trap, stormwater shall flow into drop inlet number 3, through the 24-inch diameter stormwater sewer and then into the existing retention basin. The hydraulic calculation for the proposed eastern perimeter channel is based on the 100-year, 24-hour storm event for

the area. The plan location and detail for the proposed eastern perimeter channel is shown on Earth Tech Drawings CL-04/CL-05 and CL-07, respectively.

2.6.2.3 Drop Inlets

The permanent E&S control design includes adding three drop inlets to the existing stormwater management system. Two drop inlets shall be retrofitted to the existing 24-inch diameter HDPE stormwater sewer. Drop inlet number 3, to be installed northeast of the retention basin and located within the proposed sediment trap, shall accommodate the stormwater flow from the eastern perimeter channel. Drop inlet number 2, to be installed north of the ERMA, is designed to accommodate the stormwater along the northern perimeter of the cap system. For additional stormwater handling capacity, the surrounding topography for both drop inlets has been designed such that potential stormwater overflow would be directed into the existing channel.

A third drop inlet (number 4), shall be installed in the northeastern portion of the ERMA, and is designed to accommodate the stormwater from this area of the cap system. For additional stormwater handling capacity, the surrounding topography for the drop inlet has been designed such that potential stormwater overflow would be directed into the existing channel and/or drop inlet number 2.

The Muhlenberg Township stormwater management criteria require on-site private stormwater piping to be designed to handle the 10-year post-development flow. Analysis was performed for both the 2-year and 10-year storm events. The results of the analysis show that the existing 24-inch diameter stormwater pipe has the capacity to accommodate the increased stormwater flow from the ERMA area without overtopping the drop inlets. The drop inlets are shown on Earth Tech Drawings CL-04/CL-05 and CL-08.

2.6.2.4 Sediment Trap

The proposed sediment trap shall be constructed at the discharge point of the eastern perimeter channel. From the eastern perimeter channel, stormwater shall flow into and collect in the sediment trap. Stormwater shall eventually flow into drop inlet number 3 and into the existing retention basin via the existing 24-inch diameter HDPE stormwater pipe.

The sediment trap is shown on Earth Tech Drawing Numbers CL-04, CL-05, CL-06 and CL-08. The purpose of the sediment trap is to collect sediment in the stormwater sheet flow from the ERMA along with stormwater discharge from the proposed eastern perimeter channel.

FINAL (100 PERCENT COMPLETE) DESIGN RCRA CORRECTIVE MEASURES IMPLEMENTATION EAST RED MUD AREA & WEST RED MUD AREA CLOSURES NGK METALS CORPORATION FACILITY MUHLENBERG TOWNSHIP, BERKS COUNTY, PENNSYLVANIA SEPTEMBER 2002

NGK SITE VICINITY



VICINITY MAP

REFERENCE:

PENNSYLVANIA OFFICIAL TRANSPORTATION MAP, DATED 1987
APPROXIMATE SCALE: 1" = 9.47 MILES

NGK SITE LOCATION



LOCATION MAP

REFERENCE:

U.S.G.S. 7.5 MINUTE TOPOGRAPHIC MAP
TEMPLE QUADRANGLE, PA., DATED 1956,
PHOTO REVISED 1983.
SCALE: 1" = 2000'

DRAWING

TITLE

CL-01	TITLE SHEET
CL-02	EXISTING CONDITIONS PLAN
CL-03	RED MUD EXCAVATION PLAN
CL-03A	RED MUD EXCAVATION AREA - ENLARGEMENT VIEWS
CL-04	ERMA INTERIM GRADING PLAN
CL-05	ERMA GRADING PLAN, TOP OF ASPHALT CAP
CL-06	STORMWATER RETENTION BASIN MODIFICATIONS AND SEDIMENT TRAP
CL-07	CAPPING SYSTEM DETAILS
CL-08	STORMWATER/EROSION AND SEDIMENT CONTROL DETAILS (SHT 1 OF 2)
CL-09	STORMWATER/EROSION AND SEDIMENT CONTROL DETAILS (SHT 2 OF 2)
CL-10	CAPPING SYSTEM SECTIONS



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1-800-242-1776

POCS SERIAL NUMBER

PREPARED BY:



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MECHANICSBURG, PA. 17055

PREPARED FOR:



NGK Metals Corporation

PO BOX 13387
READING, PA 19605

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OR IN ANY WAY DISCLOSE THE CONTENT OF DRAWINGS TO
ANY THIRD PARTY WITHOUT FIRST HAVING OBTAINED NGK
METALS CORP. PRIOR WRITTEN CONSENT. RECIPIENT AGREES
TO RETURN THE DRAWINGS AND ANY COPIES TO NGK
METALS CORP. IMMEDIATELY UPON NGK METALS CORP.
REQUEST.

PREPARED: SEPTEMBER 2002

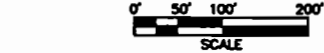
PROJECT NO.: 29413.70

1	REVISED TO REFLECT DRAINAGE MOD AND CLIENT COMMENTS	SEPT 2002
2	SUBMITTED TO EPA FOR APPROVAL	SEPT 2002
3	REVISED PER 1/28/03 EPA COMMENTS	MARCH 2003



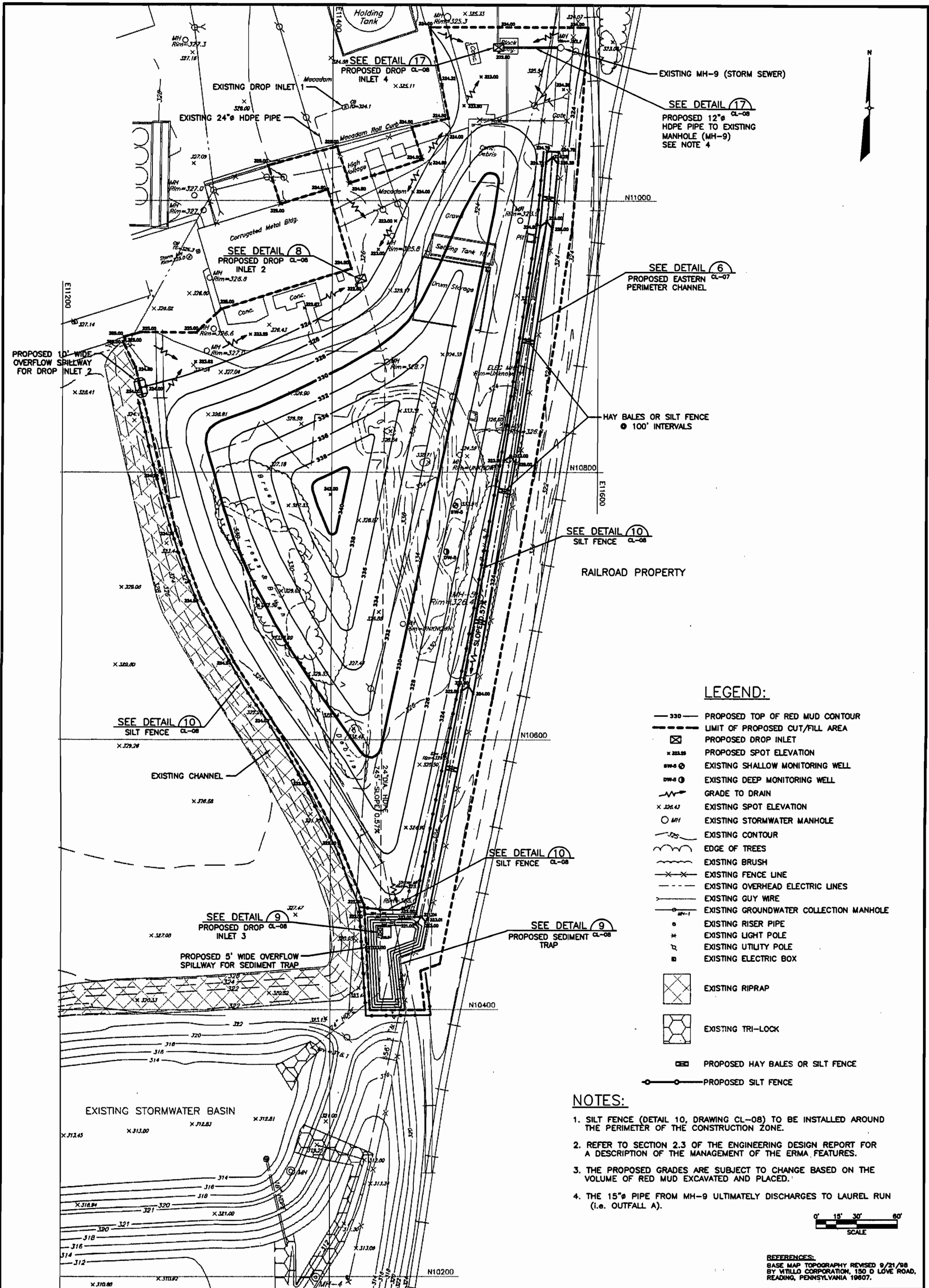
- LEGEND:**
- APPROXIMATE PROPERTY LINE
 - EXISTING BUILDING STRUCTURES
 - SW-17 EXISTING SHALLOW MONITORING WELL
 - DW-12 EXISTING DEEP MONITORING WELL
 - WELL-1 EXISTING LANDFILL WELL
 - EXISTING TREES AND SHRUBS
 - EXISTING MARSH
 - EXISTING FENCE LINE (TYP.)
 - EXISTING EDGE OF TREES (TYP.)
 - - - PROPOSED CONTOUR
 - EXISTING OVERHEAD ELECTRIC LINES
 - EXISTING GUY WIRE
 - EXISTING MANHOLE
 - EXISTING RISER PIPE
 - EXISTING LIGHT POLE
 - EXISTING UTILITY POLE
 - EXISTING ELECTRIC BOX
 - EASTERN CHANNEL RED MUD EXCAVATION AREA
 - ▨ OFF-SITE RED MUD EXCAVATION AREA
 - ▨ WESTERN RED MUD EXCAVATION AREA
 - ▨ SEDIMENT TRAP EXCAVATION AREA

- NOTES:**
1. REFERENCE THE REPORT TITLED "RCRA CORRECTIVE MEASURE IMPLEMENTATION, WESTERN RED MUD AREA, SOIL BORING INVESTIGATION" PREPARED BY EARTH TECH FOR NGK METALS CORPORATION IN MARCH 2002.
 2. REFERENCE THE REPORT TITLED "RCRA CORRECTIVE MEASURE IMPLEMENTATION, OFF-PROPERTY RED MUD AREA, SUPPLEMENTAL SOIL BORING INVESTIGATION" PREPARED BY EARTH TECH FOR NGK METALS CORPORATION IN AUGUST 2002.
 3. THE EXCAVATED AND STOCKPILED RED MUD SHALL BE PLACED WITHIN THE EAST RED MUD AREA AS SHOWN ON DRAWING CL-04, AND BELOW THE ASPHALT CAP AS SHOWN ON DRAWING CL-05.
 4. THE APPROXIMATE ESTIMATED DIMENSIONS FOR OFF-SITE RED MUD REMOVAL IS APPROXIMATELY 850'x10'x3' DEEP.

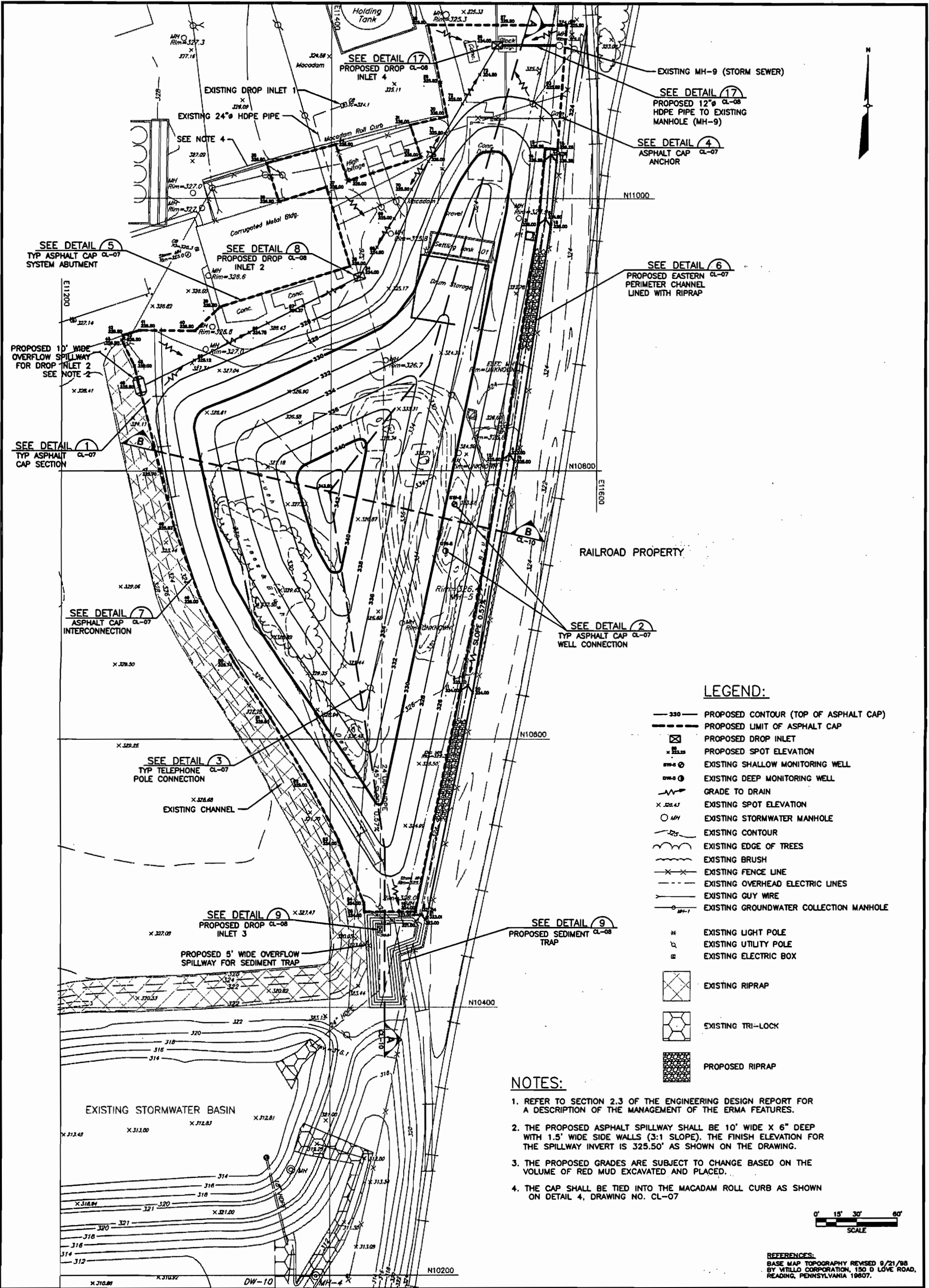


REFERENCES:
BASE MAP MATERIAL WAS COMPILED AND COMPLETED BY AERIAL DATA REDUCTION ASSOCIATES, INC. 260 KAPPA DRIVE, PITTSBURGH, PENNSYLVANIA 15238
BASE MAP TOPOGRAPHY REVISED 9/21/98 BY VITULO CORPORATION, 150 D LOVE ROAD, READING, PENNSYLVANIA 19607.

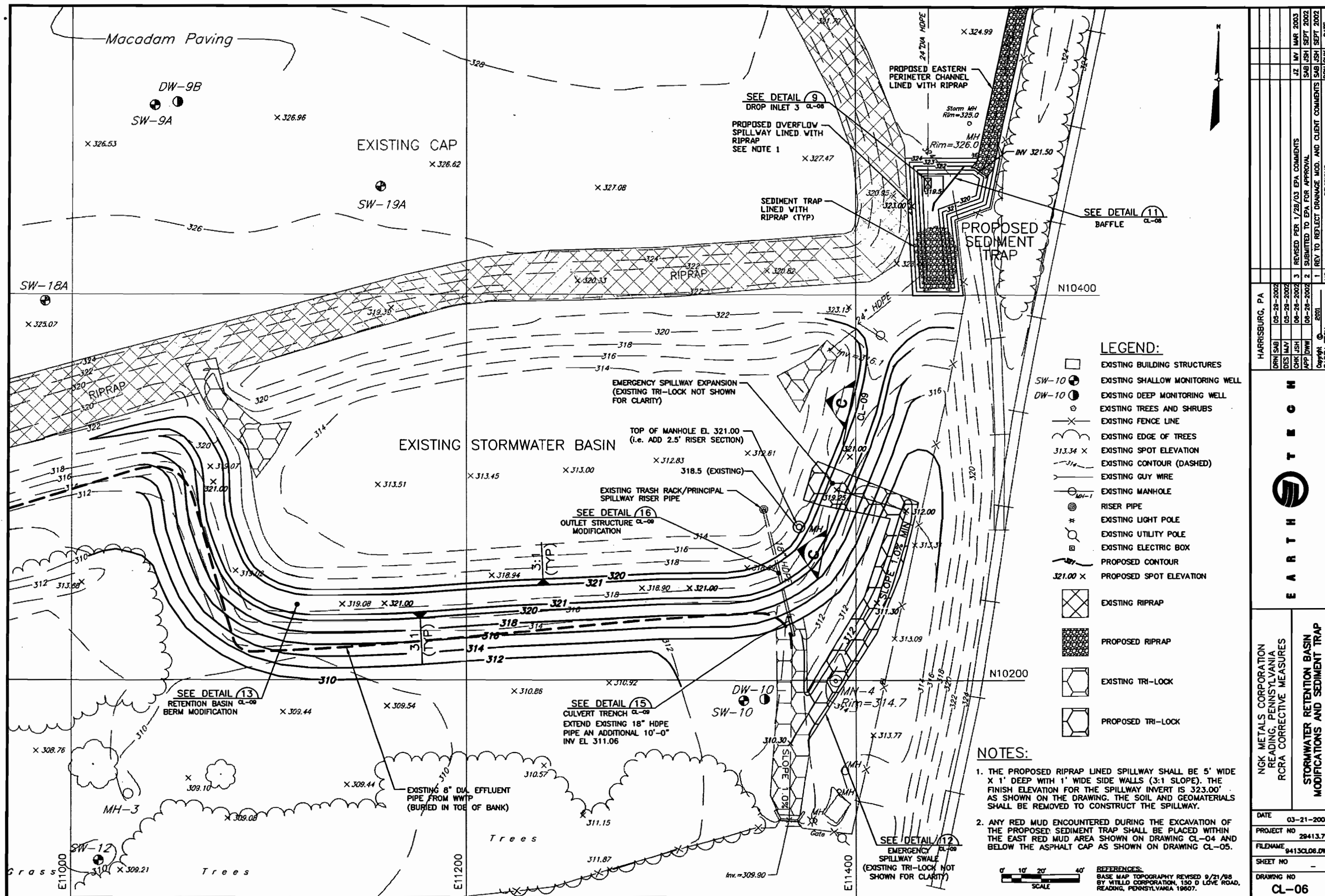
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DES MAY	05-29-2002	FILENAME	9413CL03.DWG		
CHK JSH	06-28-2002	SHEET NO	-		
APP DWV	06-28-2002	DRAWING NO	CL-03		
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EARTH TECH					
NGK METALS CORPORATION READING, PENNSYLVANIA RCRA CORRECTIVE MEASURES		RED MUD EXCAVATION PLAN			
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